

stream reached a stage of 23.2 feet, or 1.2 feet above the danger point, at Gonzales on the 25th, and of 19.9 feet, or 3.9 feet above flood stage, at Victoria on the 28th. No damage was done, and the rise subsided as rapidly as it came.

SNOWFALL IN THE MOUNTAINS.

While the precipitation averaged below the normal, unusually heavy snow occurred from the 23d to 25th, accompanied by high winds, which caused much drifting into the arroyos and canyons. Cold weather checked melting in the higher districts, and the snow is now generally well packed and icy, except in the case of recent falls. On the other hand, the ground is deeply frozen and the run-off, when melting begins, will be more rapid and lessen the duration of the late flow from this source. Whether the early flow will reach the average on the Rio Grande will depend upon the weather conditions during March, April, and May. At the close of the month the average depth over the headwaters of the Rio Grande was 10 inches less than a year ago. Deep snow over the lower levels of the Rio Pecos gives promise of favorable conditions for the early season, but lack of snow at the headwaters is unfavorable for a later stream flow.

SMUDGING AGAINST FROST.

The St. Louis Southwestern Railway Co. of Texas owns 90 acres in fruit trees at Morrill, Tex., and is experimenting with smudges as a protection against frost. Warnings of frosts, freezes, and cold waves are furnished by wire from the Weather Bureau office at New Orleans, La. Mr. W. J. Doyle, assistant agricultural and industrial agent of that company, has furnished the following preliminary report, which will explain itself:

All of the fruit growers in East Texas are keeping their eyes on the experiment which we are carrying on at our farm at Morrill, Tex., and if it proves out like I am sure it will do I know that these people will take the same precaution that we have for the coming years. So far we have burned our smudges three nights. You understand, we have 90 acres in trees, and only 45 acres of it in smudges. The warning of Tuesday, February 27, was very timely, and our superintendent lit the smudges at 11 o'clock and closed them out at 7 in the morning. In comparing the condition of the 45 acres with the smudges and the others there is a decided difference in the condition of the trees and buds. The ones with the smudges are in a much better state of development than the others and show no evidence whatever of cold, while in some instances in the orchard unprotected, they were touched just a little, not enough to damage, but at the same time noticeable. The service has been very good so far.

STORM OF FEBRUARY 20, 1912, AT AUSTIN, TEX.

By Prof. ALEXANDER DEUSSEN, in-charge of the meteorological observatory of the University of Texas, Austin, Tex.

An unusually violent wind storm raged in Austin on the night of the 20th of February, 1912.

The phenomenon was that of the "norther," developed in an intense degree. Never in the experience of the writer nor in the records of the local observatory has there been a wind accompanying a norther of such violent and destructive proportions.

On the morning of the 20th the observatory barometer was unusually low, exciting apprehension, and being the subject of comment at the time. The lowest was noted at 12 m., when a reading of 29.55 inches, reduced to sea-level and standard temperature, was observed. The temperature at 11 a. m. was 66°, the humidity was 84 per cent, and the wind in the southwest, having veered from a south-southeast direction, and blowing at the low velocity of 2.66 miles per hour.

The morning weather map showed a well-defined low, central over northeast Texas, with a pressure reading at the center of 29.5 inches, and a well-defined high, central over Wyoming, Idaho, and Montana, with a reading at the center of 30.5 inches. A very steep barometric gradient was lying over the Texas Panhandle and the State of Colorado, and high winds, with a cold wave, to advance over Texas, was a logical inference.

At 12 m. the barometer began to move upward, rising 0.05 of an inch and falling back to 29.55 inches in the space of two hours. At the same time the wind shifted to the west-northwest, but the velocity was not high, being 33 miles per hour.

At 3 p. m. the front of the advancing mass of cold, dry air, characterizing the high, had reached the latitude of Austin, as evidenced by the sudden rise of the barometer and the sudden fall in temperature and humidity, shown by the recording instruments in the observatory. At the same time the velocity of wind increased, but not in a very notable degree.

From 3 p. m. until 8 p. m. the barometer rose steadily and rapidly, and the winds increased steadily in velocity, but they did not obtain noticeable violence, or violence beyond that commonly observed in a norther, until 6 p. m.

At 8 o'clock the winds, having steadily increased in fury, were causing much apprehension. In response to an urgent appeal from the correspondent of the Dallas News for some data on the velocity of the wind and the movements of the barometer, the writer ventured to the observatory and took some readings. The velocity for five-minute intervals was then at the rate of 60 miles per hour, and the wind-pressure gauge was showing maximum gusts in the amount of 19 pounds to the square foot.

At 8 p. m. the barometer dropped suddenly from 29.85 to 29.76 inches, reduced to sea level, in the space of 30 minutes, and then continued the rise, getting back to the former position of 29.85 inches in the course of two hours. During this period of fluctuation in the barometer the storm attained to maximum violence and to hurricane intensity, the anemometer indicating a velocity for a five-minute interval of 69 miles to the hour, and the wind-pressure gauge indicated a maximum gust pressure of 31 pounds to the square foot, equal to a velocity, if maintained for an hour, of 78 miles.

After 10 p. m. the wind gradually lulled. Gusts came less frequently, were not so violent, and longer intermittent spells of low winds became more common. After 12 midnight the winds subsided, blowing at that time at a velocity of 36 miles per hour. The barometer continued its rise until 11.30 p. m., reaching its maximum at that time, when the reading was 30.17 inches, reduced to sea level. In the course of 11½ hours it had risen 0.62 of an inch, or from 29.55 to 30.17 inches.

The storm was especially noteworthy, first because of the extreme velocity of the winds, and second because of the departure from the usual sequence of "norther" or cold-wave phenomena. Commonly maximum velocities are attained very shortly after the barometer begins its rise, usually an hour later, and from that time on gradually weakens. In this instance a steady increase in velocity was noted for at least nine hours after the approach of the advancing cold, dry air sheet. Further, the violently fluctuating barometer during the advance of the cold-air sheet indicated highly abnormal atmospheric conditions.

During the entire course of the storm, with the exception of a brief interval at the time of maximum severity, between 8.30 and 10 p. m., the sky was absolutely

clear, and at night the stars shone brightly. A slight cloud film overcast the sky during the period last mentioned, and between 6 and 7 p. m. a dark cloud bank hovered on the western horizon, but disappeared by 8 p. m.

Conservative estimates place the damage done in the city of Austin at \$35,000.

While phenomena of the type here described are unusual and will doubtless not be soon repeated in this vicinity, a number of conclusions and reflections can not be avoided so far as the local community is concerned.

One of these is the wisdom of requiring electric wiring of all kinds to go underground. Not only is the danger from fallen live wires immense, but it is desirable that lights be available, and, in the case of cities like Austin, without a fire-alarm system, it is essential that the telephone system be kept in operation, in order to report fires in their inception. With an underground system not only would there be no danger from fallen wires, but lighting systems could be kept going, and, more important still, the communicating system could be kept open.